NJBK9 Motor protection relay

1. General

NJBK9 series motor protection relay (hereinafter referred to as "Pro-tecter") is used for overload protection, locked rotor protection, phase failure protection, three-phase unbalance protection, grounding protection and PTC temperature protection for AC electromotors of a frequency of 50Hz with a rated insulation voltage of up to 690V and a rated operating current of 1A-200A during long-term and discontinuous operation.

This protector is provided with RS485 interface and 4-20mA current loop transmitter interface for network communication and performs remote monitor & control on the motor and fault query through opper computer.

This protecter is usually used to combine with AC contactor.

Standards: IEC 60947-4-1

2. Type designation

N JBK 9 - □ □ □/□/□

- Control power supply voltage (AC220V, AC380V, AC/DC100V~240V)
- Rated current: 5, 10, 30, 50, 200
- None: 4mA~20mA analog transformation is not available
  M: 4mA~20mA analog transmission
- None: Communication interface is not available
  T: RS485 communication interface
- Enclosure grade: 50, 200
- Design sequence No.
- Motor protection relay
- Company code

3. Operation conditions

3.1 Altitude: should not exceed 2000m;
3.2 Ambient tempeature: -5℃~+40℃, and the average temperature in 24h should not exceed +35℃;
3.3 Atmospheric conditions: The relative air humidity should not exceed 50% at the maximum temperature of +40℃. The relative humidity may be higher at lower temperatures, for example, the air humidity can be up to 90% at +20℃. Special measures should be taken if condensation occurs on the product occasionally due to temperature variation;
3.4 Pollution degree: 3;
3.5 The inclination between the mounting plane and the vertical plane should not exceed ±5°;
3.6 In non-explosive media that do not contain a sufficient amount of gas or conductive dust to cause metal corrosion or insulation failure;
3.7 In places with rain and snow protection equipment and not full of vapor;
3.8 In places where there is no significant shake, impact or vibration;
3.9 Mounting category: Ⅲ;
3.10 Degree of protection of enclosure: IP20.

4. Technical data

4.1 Main circuit: rated insulation voltage: AC690V, rated frequency: 50Hz

Model	Setting current (A)	Setting current range (A)	Matching motor power (kW)
NJBK9-50□□/5/□	5	1~5	0.5~2.5
NJBK9-50□□/10/□	10	2~10	1~5
NJBK9-50□□/30/□	30	6~30	3~15
NJBK9-50□□/50/□	50	10~50	5~25
NJBK9-50□□/200/□	200	40~200	20~100

4.2 Auxiliary circuit: rated insulation voltage: AC380V, rated frequency: 50Hz, data of auxiliary contact

Usage category	AC-15	
Rated operational voltage Ue(V)	240	380
Rated operational current Ie(A)	1.5	0.95
Conventional heating current Ith(A)	5	

4.3 Product selection table

Model	Overload	Phase failure	Ground	PTC	Communication	4mA~20mA	Unbalance	Locked rotor
NJBK9-50/□/□	◆	◆	◆	◆			◆	◆
NJBK9-50T/□/□	◆	◆	◆	◆	◆		◆	◆
NJBK9-50M/□/□	◆	◆	◆	◆		◆	◆	◆
NJBK9-50TM/□/□	◆	◆	◆	◆	◆	◆	◆	◆
NJBK9-200/□/□	◆	◆	◆	◆			◆	◆
NJBK9-200T/□/□	◆	◆	◆	◆	◆		◆	◆
NJBK9-200M/□/□	◆	◆	◆	◆		◆	◆	◆
NJBK9-200TM/□/□	◆	◆	◆	◆	◆	◆	◆	◆

4.4 Structural features
4.4.1 Split mounting;
4.4.2 LCD display, key setting;
4.4.3 Has start delay function;
4.4.4 Has fault memory function, permits inquiry of fault record;
4.4.5 Has RS485 interface, supports MODBUS protocol, permits network communication;
4.4.6 With 4mA-20mA analog output interface;
4.4.7 Has two groups of output contacts, 1Z protection contact and 1H auxiliary contact, and permits autotransformer reduced voltage starting and star-delta starting;
4.4.8 Power consumption: ≤3VA.

5. Protection characersitics

5.1 Operating characteristics of overload protection

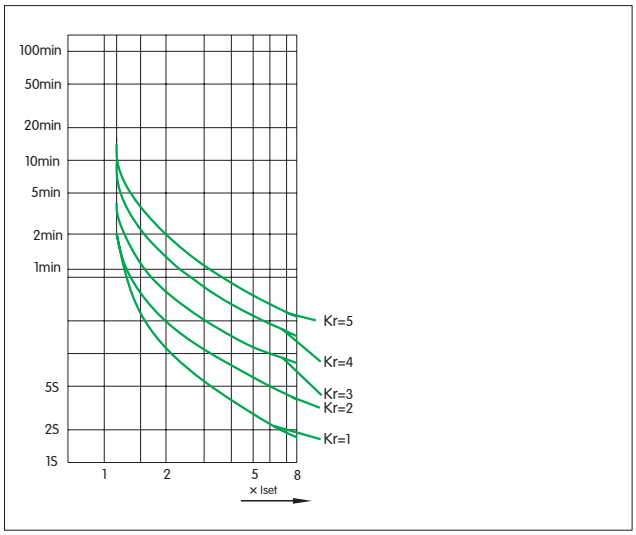
Overload curve / Operation time (s) \ Overload multiple	1.1	1.2	1.5	2	5	6	7.2	Note
Kr=1	75	63	40	22	3.6	2.5	1.8	
Kr=2	150	125	80	45	7.2	5	3.5	In conformity with Class 10A
Kr=3	298	250	160	90	14	10	6.9	In conformity with Class 10
Kr=4	595	500	320	180	29	20	14	In conformity with Class 20
Kr=5	892	750	480	270	43	30	21	In conformity with Class 30

5.2 Operating characteristics of phase failure protection
When the current of any phase of the three-phase current of the main circuit is equal to zero, the protector operates for a period of ≤5s.
5.3 Operating characteristics of three-phase current unbalance protection
When the three-phase current of the main circuit meets the following formula, the protector operates for a period of ≤5s.

$$\frac{Imax-Imin}{Imax} \times 100\% \geq \text{set current unbalance rate}$$

Imax: Max. phase current value
Imin: Min. phase current value
5.4 Operating characteristics of ground protection
When zero sequence current ≥ set ground protection current value, the protector operates for a period of ≤1s.
5.5 Operating characteristics of locked rotor protection
When Max. phase current ≥ setting current value×set locked rotor multiple, the protector operates for a period of ≤ 1s.
5.6 Operating characteristics of temperature protection
The over-temperature protection function of the protector is accomplished by detecting the resistance of the PTC thermistor preembedded in the motor stator widing. When the resistance of the PTC thermistor ≥2.5kΩ, the protector operates for a period of ≤1s.
5.7 Communication: The protector provides RS485 interface and supports MODBUS protocol.

Tripping characteristic curve



6. Connection diagram

Figure 1 Direct starting connection diagram in case the control supply voltage is 220V and the rated operational voltage is 220V

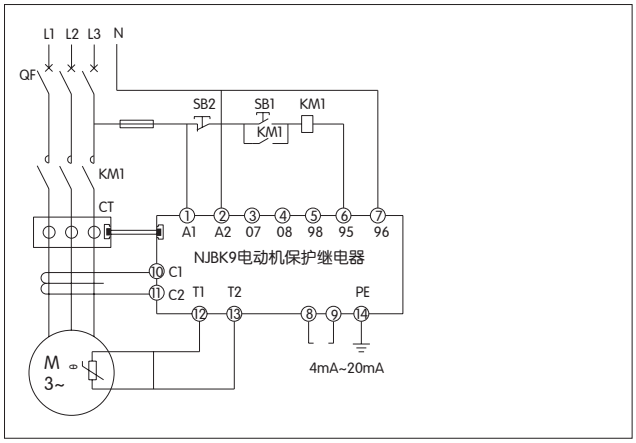


Figure 2 Secondary current direct starting connection diagram in case the control supply voltage is 220V and the rated operational voltage is 220V

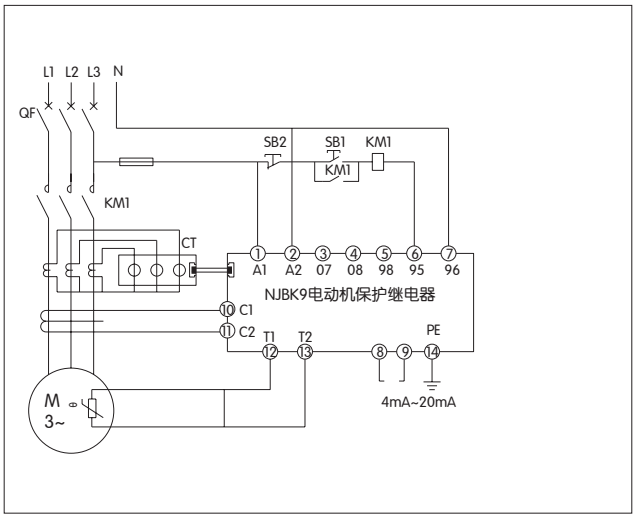


Figure 3 Autotransformer reduced voltage starting connection diagram in case the control supply voltage is 220V and the rated operational voltage is 220V

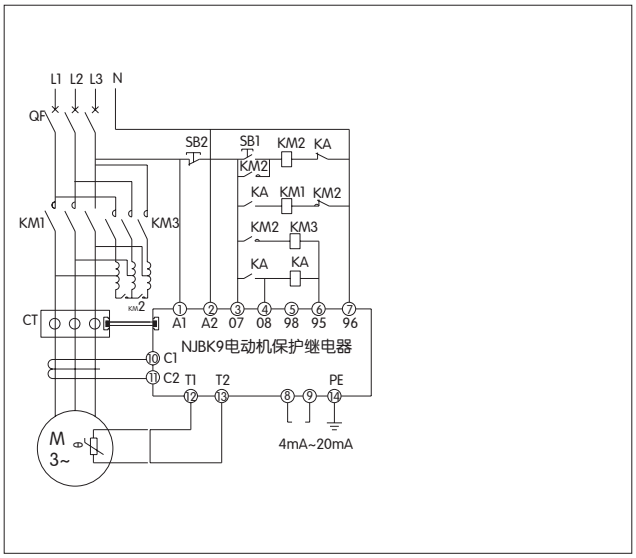
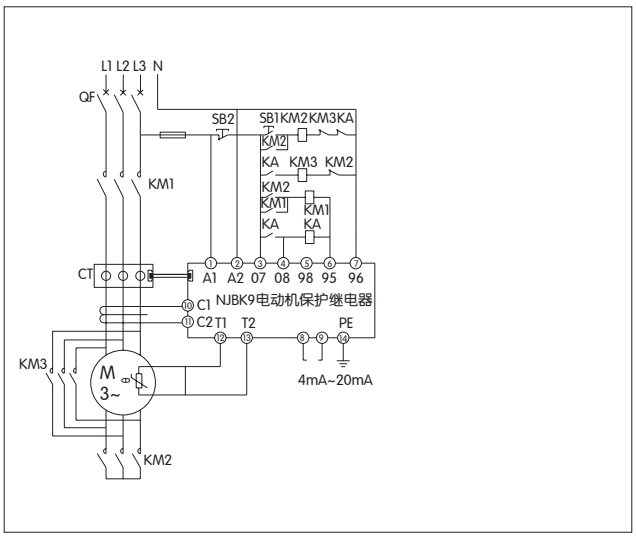
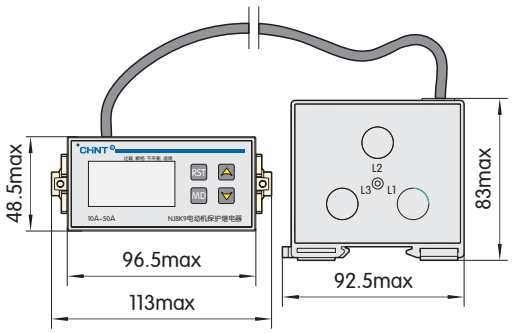


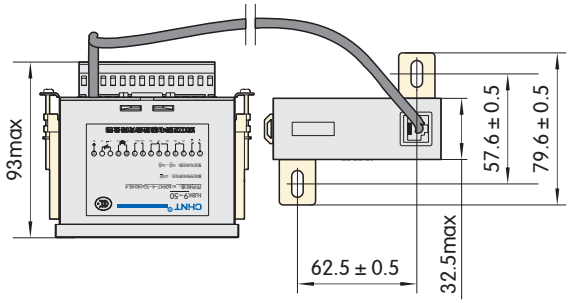
Figure 4 Star-delta starting connection diagram in case the control supply voltage is 220V and the rated operational voltage is 220V



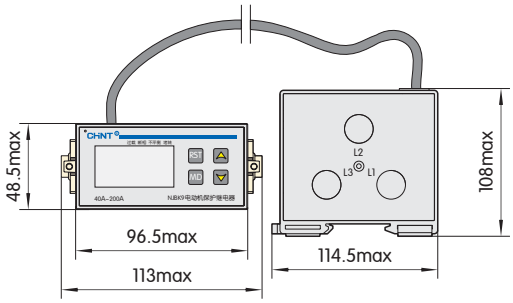
7. Overall and mounting dimensions (mm)

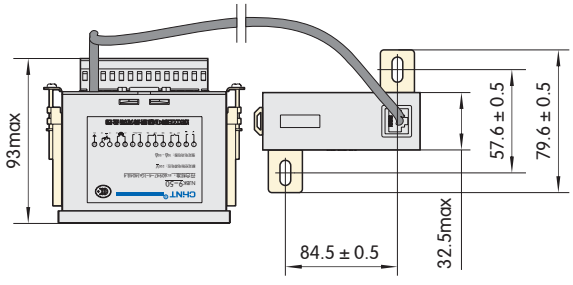
NJBK9-50 overall mounting dimensions





NJBK9-200 overall mounting dimensions





Opening size of the main machine